

What is claimed is:

1. A power conversion device, comprising:

a plurality of power conversion circuits

5 constituted of a plurality of semiconductor elements  
that convert AC to DC or DC to AC by switching actions  
of said semiconductor elements; and

a cooling unit configured to cool said power  
conversion circuits,

10 wherein said cooling unit further comprises

a heat sink section that accepts heat loss; and

a heat discharging section that discharges said  
heat loss accepted by said heat sink section.

15 2. A power conversion device, comprising:

a plurality of sets of inverter circuits configured  
to connect loads of respectively different outputs by  
switching actions of a plurality of semiconductor  
elements; and

20 a cooling unit configured to cool said inverter  
circuits,

wherein said cooling unit further comprises a heat  
sink section and heat discharging section.

25 3. A power conversion device, comprising:

a plurality of sets of variable voltage, variable frequency inverter circuits that invert DC to AC of variable voltage and variable frequency by switching actions of a plurality of semiconductor elements;

5 a constant voltage constant frequency inverter circuit that inverts DC into AC of constant voltage and constant frequency; and

10 a cooling unit on which said variable voltage, variable frequency inverter circuits and said constant voltage constant frequency inverter circuit are mounted, wherein said cooling unit further comprises a heat sink section and heat discharging section.

4. A power conversion device, comprising:

15 a converter circuit that converts AC to DC by switching actions of a plurality of semiconductor elements;

an inverter circuit that inverts said DC converted by said converter circuit into AC; and

20 a cooling unit configured to cool both first semiconductor elements constituting said converter circuit and second semiconductor elements constituting said inverter circuit,

wherein said cooling unit further comprises a heat sink section and a heat discharging section.

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5. The power conversion device according to any of claims 1 to 4,

wherein said plurality of semiconductor elements are divided into each phase or into positive side and negative side, and said sets of divided semiconductor elements are mounted on said cooling unit provided corresponding to said sets of semiconductor elements.

6. The power conversion device according to any of claims 1 to 4,

wherein said heat sink section of said cooling unit has a heat pipe that mutually transports a heat of mounting sections of said semiconductor elements of mutually different circuits.

7. The power conversion device according to any of claims 1 to 4,

wherein said heat sink section of said cooling unit is of box shape with coolant sealed inside.

8. The power conversion device according to any of claims 1 to 4,

wherein said heat sink section of said cooling unit is constructed so that semiconductor elements can be mounted on a front face and a rear face, set of semiconductor elements that constitutes one set of said

power conversion circuits being mounted on one face,  
while set of semiconductor elements that constitutes  
said other set of power conversion circuits is mounted  
on said other face.

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9. The power conversion circuit according to any of  
claims 1 to 4,

wherein sets of semiconductor elements of different  
power conversion circuits are mounted arranged  
alternately for each phase on one face of said cooling  
unit.

10. The power conversion device according to claim  
9,

wherein when said semiconductor elements are of  
different height for each power conversion circuit, a  
step is provided in said semiconductor mounting face of  
said cooling unit so that heights of electrical  
connection terminals of said semiconductor elements are  
equal.

11. A power conversion device, comprising:

a plurality of sets of power conversion circuits  
that convert AC to DC or DC to AC by switching actions  
of a plurality of semiconductor elements;

wherein if one set of said power conversion circuits malfunction, said malfunctioning power conversion circuits are isolated and operation continued with remaining set of power conversion circuits, and

5 a cooling unit having a heat sink section and heat discharging section and constructed such that a current of cooling air flows to said heat discharging section;

wherein said semiconductor elements that constitute said plurality of power conversion circuits are  
10 apportioned to each phase, a set of said semiconductor elements for the same phase are arranged in row fashion in a direction of flow of a cooling air current, and

semiconductor elements of different said power conversion circuits being mounted in common on said heat  
15 sink section and arranged in sequence in each phase in a direction of flow of said cooling air current.

12. A power conversion device, comprising:

a plurality of sets of power conversion circuits  
20 that convert AC to DC or DC to AC by switching actions of a plurality of semiconductor elements;

wherein if one set of said power conversion circuits malfunction, said malfunctioning power conversion circuits are isolated and operation continued  
25 with remaining sets of power conversion circuits, and

a cooling unit having a heat sink section and heat discharging section and constructed such that a current of cooling air flows to said heat discharging section;

wherein said power conversion is divided into a  
5 main circuit comprising said set of semiconductor elements for each said power conversion circuit and a peripheral circuit that protects said semiconductor elements,

said set of semiconductor elements of mutually  
10 different said power source conversion circuits and said peripheral circuit being arranged in row fashion in a direction of flow of a cooling air current and said main circuit comprising said set of semiconductor elements being mounted on said heat sink section of said  
15 cooling unit and said peripheral circuit being arranged in a position through which a cooling air current flows.